

# The Fast Stochastic Matching Pursuit for Neutrino Experiments

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Photomultiplier tubes (PMT) are widely deployed at neutrino experiments for photon counting. When multiple photons hit a PMT consecutively, their photo-electron (PE) pulses pile up to hinder the precise measurements of the count and timings. We introduce Fast Stochastic Matching Pursuit (FSMP) to analyze the PMT signal waveforms into individual PEs with the strategy of reversible-jump Markov-chain Monte Carlo. We demonstrate that FSMP improves the energy and time resolution of PMT-based neutrino experiments, gains acceleration on GPUs and is extensible to microchannel-plate (MCP) PMTs with jumbo-charge outputs. In the condition of our laboratory characterization of 8-inch MCP-PMTs, FSMP improves the energy resolution by up to 12% from the long-serving method of waveform integration.

## Poster prize

No

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Jinping Neutrino Experiment

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